2025, University of Toronto

A crash course on

Urban accessibility with R

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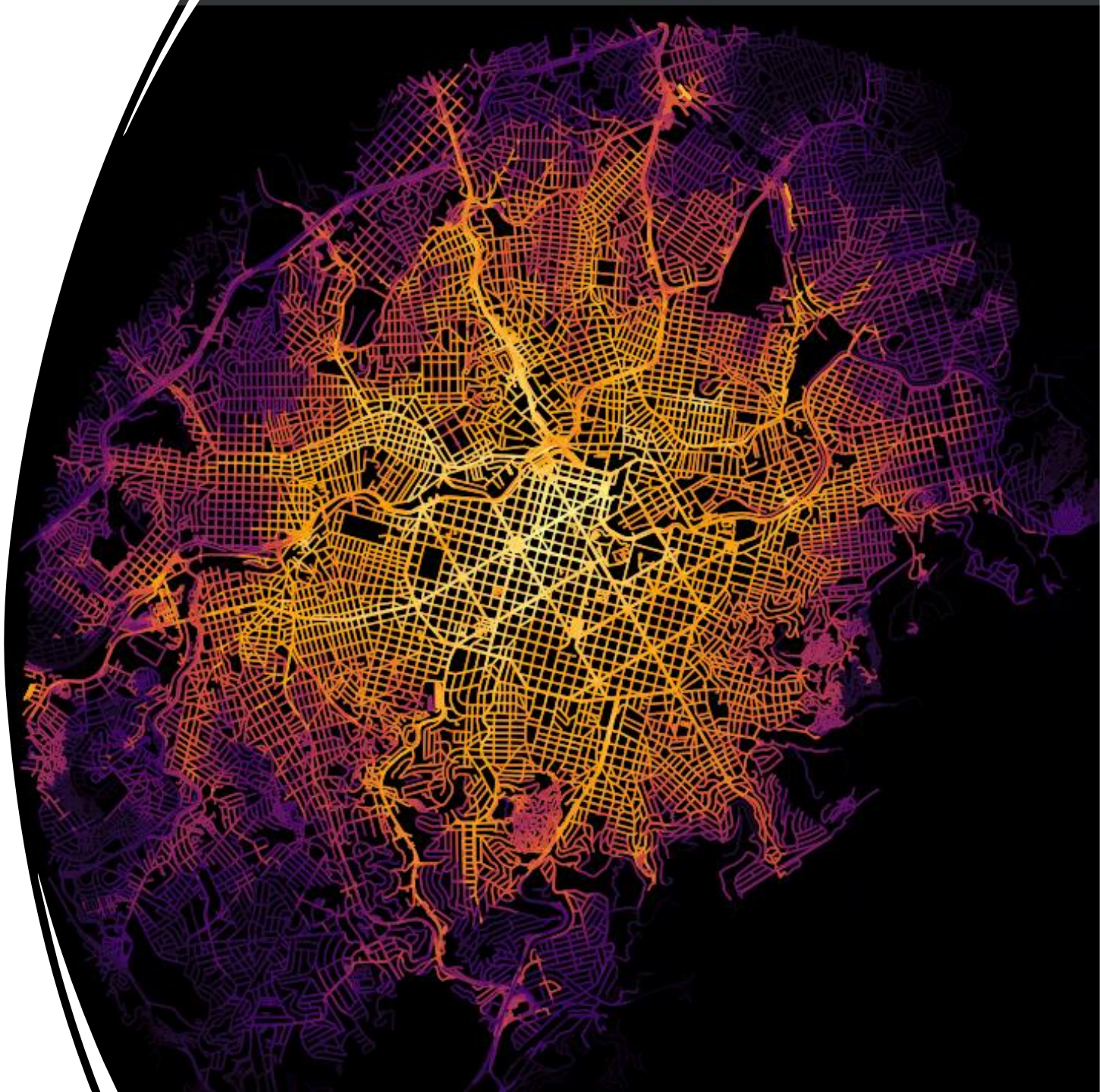
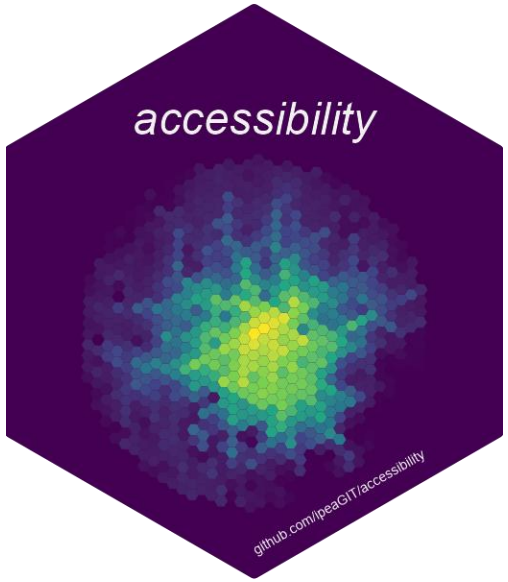
Calculating Accessibility



Purpose of the chapter

To show how to calculate urban accessibility estimates in R using the {r5r} and {accessibility} packages



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Intro to {r5r} use steps-by-step

1. Building a routable transport network

2. Accessibility: quick and easy approach

3. Accessibility: flexible approach
   a) Travel time matrix
   b) Calculate access

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Lets' code

Link to reprex with sample data

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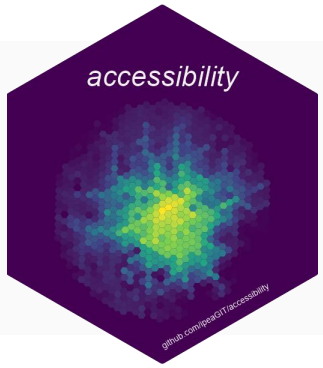

accessibility: transport accessibility metrics

CRAN 1.0.1 downloads 1317 GitHub code

https://ipeagit.github.io/accessibility

A set of efficient and convenient functions for calculating accessibility indicators

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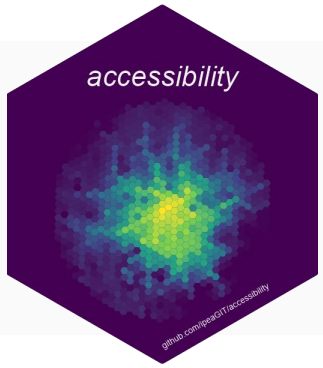

accessibility: transport accessibility metrics

CRAN 1.4.0 | downloads 15K | GitHub code

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Several place-based measures:

- `cost_to_closest()`
- `cumulative_cutoff()`
- `cumulative_interval()`
- `floating_catchment_area()`
- `gravity()`
- `spatial_availability()`
- `balancing_cost()`

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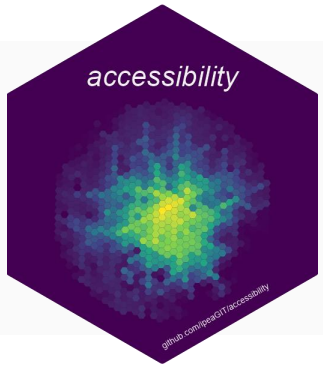

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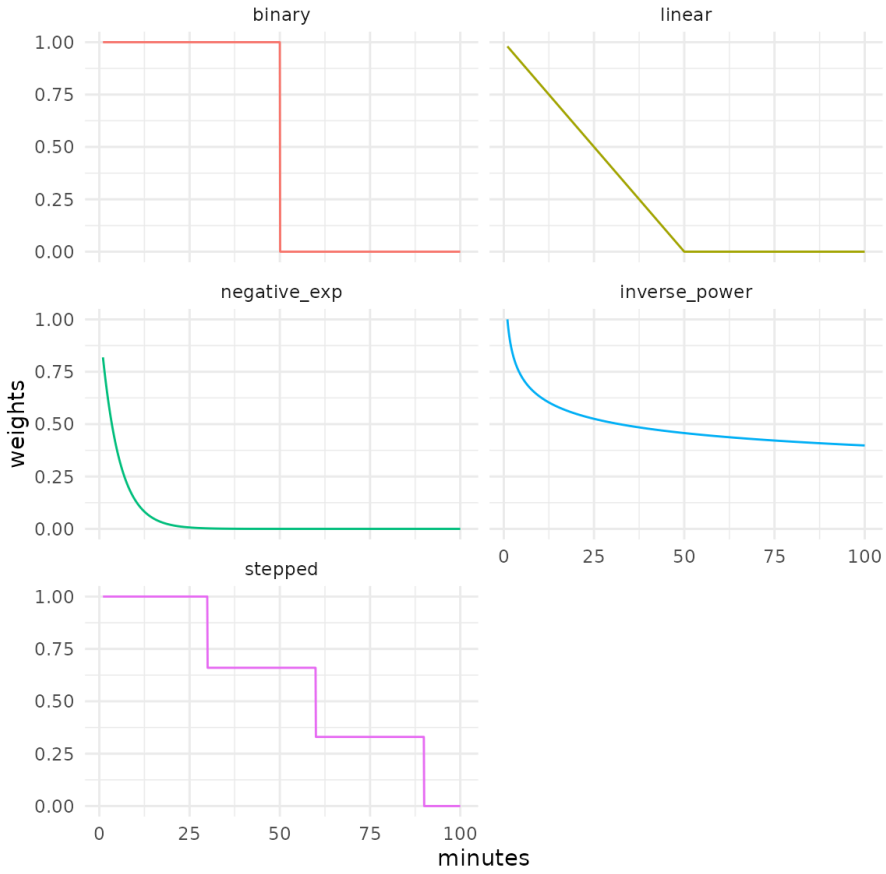
Several decay functions:

- `decay_binary()`
- `decay_exponential()`
- `decay_linear()`
- `decay_logistic()`
- `decay_power()`
- `decay_stepped()`



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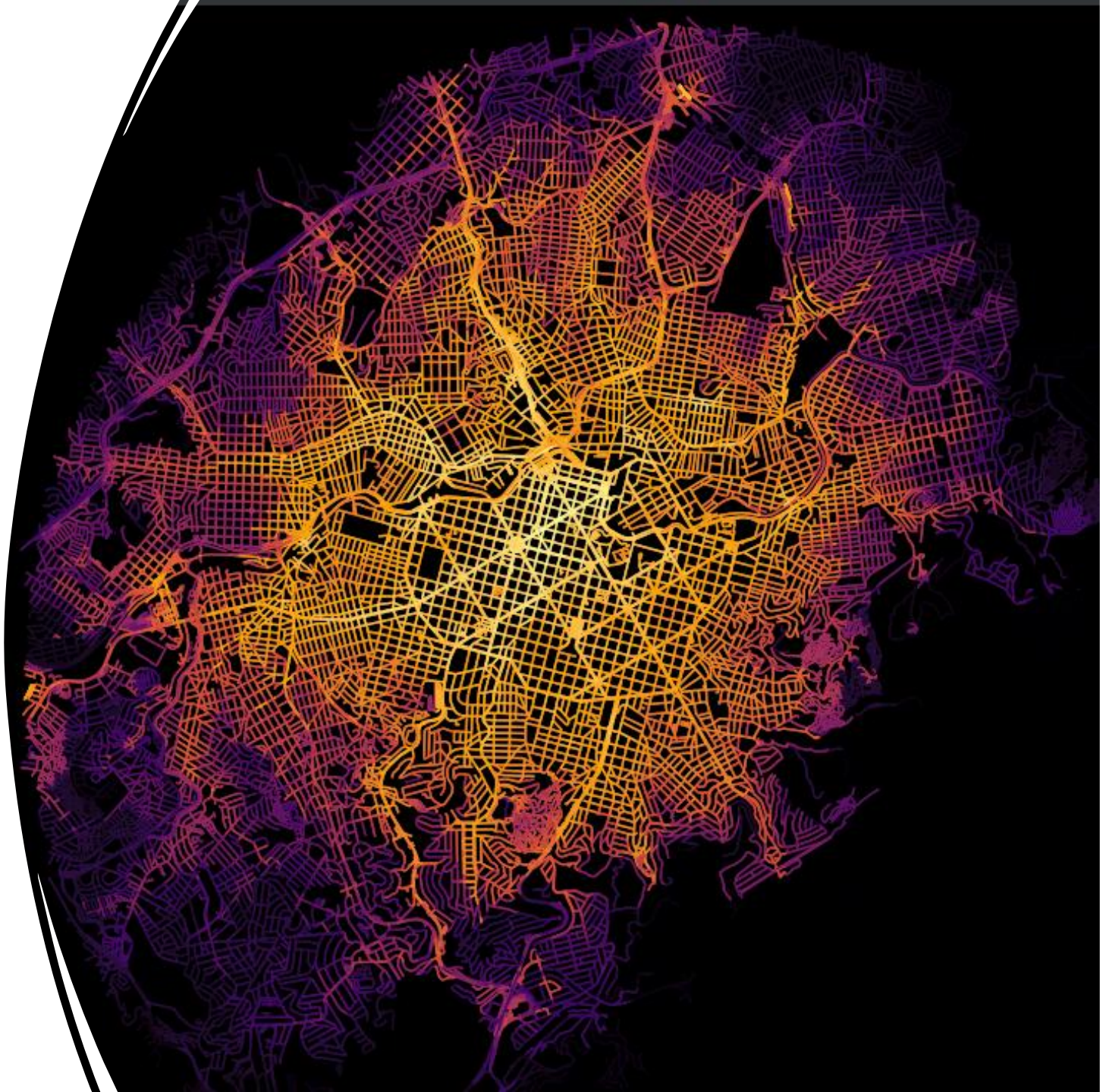
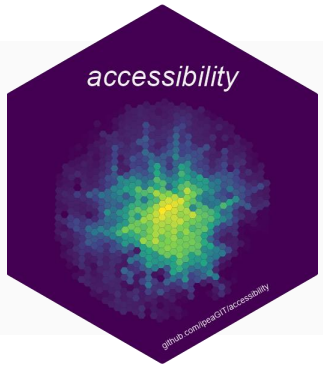
Accessibility inequality and poverty





accessibility: transport accessibility metrics

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Inequality indicators:

- `concentration_index()`
- `gini_index()`
- `palma_ratio()`
- `theil_t()`

Poverty indicators:

- `fgt_poverty()`

All 3 Foster-Greer-Thorbecke (FGT) poverty measures

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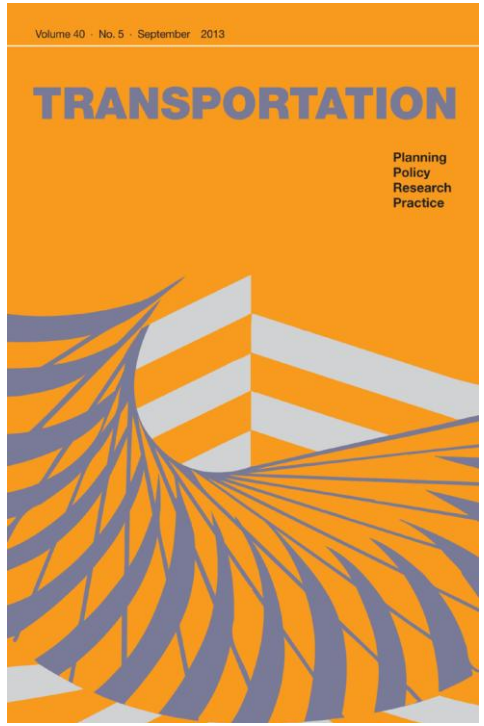
Karner, A., Pereira, R. H., & Farber, S. (2024). **Advances and pitfalls in measuring transportation equity**. *Transportation*



Inequality indicators:

1. ~~Gini index~~ it ignores groups' rankings*
2. **Theil index** ! only Ok for categorical groups*

3. **Palma ratio** ignores variations within groups
4. **Concentration index**
   - Same intuition as Gini/Lorenz *but* population along the x-axis is ordered by a socioeconomic variable
   - Varies from -1 to 1

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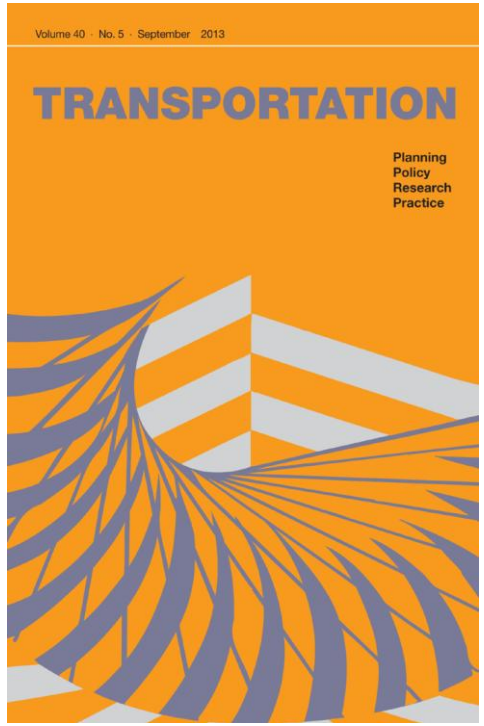

FGT family of **Poverty indicators:**

FGT_0 : ***extent*** of poverty

Number of people below poverty line

FGT_1 : ***severity*** of poverty

Average percent distance between the poverty line and the accessibility of individuals below it

FGT_2 : **extent** and **severity**

The umber of people below the poverty line weighted by the size of the accessibility shortfall (higher weight on the poverty of the poorest)

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Lets' code

Link to reprex with sample data

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